

An Indian-Australian research partnership

**Project Title:**

Structure and Deformation of Lithosphere in the Andaman basin, and relations to Eastern Indian Ocean Subduction Zone and Asian Continental tectonics

**Project Number**

IMURA0491

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**IITB Department:**

Earth Sciences

## Research Academy Themes:

**Highlight which of the Academy's Theme(s) this project will address?**

(Feel free to nominate more than one. For more information, see [www.iitbmonash.org](http://www.iitbmonash.org))

1. **Advanced computational engineering, simulation and manufacture**
2. Infrastructure Engineering
3. Clean Energy
4. Water
5. Nanotechnology
6. Biotechnology and Stem Cell Research

## The research problem

The formation of the Andaman basin in the back-arc of the Southeast Asian convergent margins remains at odd with our understanding of how subduction zones work. Large lateral, margin-parallel motions must be invoked to explain the formation of such basin, however, how and why the strike of the deformation develops perpendicular to the convergence between Indian Ocean and Asia is not understood. Recent advance in numerical modelling of subduction dynamics has illustrated the emergence of strong lateral motions in the upper plate of subduction zones, when heterogeneities in the down-going plate are entrained in the mantle. This modelling approach is thus suitable for the case of Andaman, however, thus far, the models addressed cases of indentation, with associated back-arc thickening, so that the application to lithospheric thinning of the Andaman case is novel. As the Andaman and the Burmese arcs link the continental collisional processes in the north, and the normal subduction zone in the south, the proposed study has implications towards understanding the regional plate kinematics of the east and southeast Asian region.

## Project aims

The aim of this project is to gain an understanding of the dynamics and inherent surface deformation in the Andaman Subduction Zone. More specifically the project aims to:

- 1) Compilation and analysis of seismicity and other geophysical parameters to understand the spatial variations in the subduction zone parameters.

- 2) Interpretation of crustal and upper mantle structure (from gravity and seismotectonics) along the arc and incorporating these in to the numerical modeling scheme
- 3) Development of suitable high performance computing workflow to understand the deformation pattern and
- 4) Propose a suitable model that explains the relation between subduction process and Andaman basin formation

### **Expected outcomes**

Collection, Analysis and processing of geophysical data of the study area  
Development of novel workflows to combine geophysical and dynamic modelling into a 3D model of the study area  
Improved understanding of the Andaman basin and relation with surrounding tectonic domains  
Novel understanding of subduction zones dynamics and the deformation in continental interiors

### **How will the project address the Goals of the above Themes?**

This project fits under the theme 1. This project is computational intensive as it requires:

- 1) Significant work on computational geophysical modelling in 2D and 3D
- 2) Numerical modelling in 2D and 3D of geodynamic processes of subduction zones
- 3) High Performance Computing novel strategies and workflow

### **Capabilities and Degrees Required**

A Masters degree M.Sc / M.Sc(Tech) in Applied Geophysics, Geophysics, Marine Geophysics from a recognized university / Institute (OR) Master students of Computer Science/Geo-informatics with knowledge / interest in dealing geological problems are also encouraged to apply.  
Candidates with skills in algorithm development and computer programming with some previous experience are desirable.

### **Potential Collaborators**

*Please visit the IITB website [www.iitb.ac.in](http://www.iitb.ac.in) OR Monash Website [www.monash.edu](http://www.monash.edu) to highlight some potential collaborators that would be best suited for the area of research you are intending to float.*